

Three new species of *Discoglypha* Warren (Lepidoptera: Geometridae) from China with a key to Chinese species

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Abstract: Three new species of the genus *Discoglypha* Warren, 1896 (Lepidoptera: Geometridae), *D. maculata* Xian & Han **sp. nov.**, *D. obliquifascia* Xian & Cheng **sp. nov.** and *D. pupula* Xian & Jiang **sp. nov.**, from China are described. The species *D. punctimargo* (Hampson, 1895), *D. aureifloris* Warren, 1896 and *D. parvifloris* Prout, 1917 **stat. nov.** are newly recorded from China. A key to eight known species from China is presented. Examined specimens and distribution of the Chinese species of *Discoglypha* are recorded. External features and genitalia are depicted.

Keywords: Sterrhinae; taxonomy; morphology; distribution

中国盘雕尺蛾属三新种及分种检索表（鳞翅目：尺蛾科）

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摘要: 本研究记述采自中国的盘雕尺蛾属 3 新种: 黄点盘雕尺蛾 *D. maculata* Xian & Han **sp. nov.**、黑带盘雕尺蛾 *D. obliquifascia* Xian & Cheng **sp. nov.** 和瞳盘雕尺蛾 *Discoglypha pupula* Xian & Jiang **sp. nov.**; 在我国首次记录点缘盘雕尺蛾 *D. punctimargo* (Hampson, 1895)、盘雕尺蛾 *D. aureifloris* Warren, 1896 和微花盘雕尺蛾 *D. parvifloris* Prout, 1917 **stat. nov.**; 提供了盘雕尺蛾属中国种类的分种检索表、检视标本、分布地以及成虫和外生殖器图。

关键词: 姬尺蛾亚科; 分类; 形态; 分布

Introduction

The genus *Discoglypha* Warren, 1896 is a member of the tribe Rhodostrophiini in the subfamily Sterrhinae. This genus was established by Warren (1896) based on the type species *D. aureifloris* Warren, 1896. Until now, seven species of *Discoglypha* have been recognized which are mainly distributed in the Palearctic, Oriental and Australian regions (Prout 1920–1941; Scoble 1999). Among them, *D. hampsoni* (Swinhoe, 1892) and *D. locupletata* Prout, 1917 recorded in China (Bastelberger 1909; Wang 1998).

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In the course of an inventory of the Sterrhinae of China, it became apparent that three new species of *Discoglypha* needed to be described. This paper describes *Discoglypha maculata* Xian & Han **sp. nov.**, *D. obliquifascia* Xian & Cheng **sp. nov.**, and *D. pupula* Xian & Jiang **sp. nov.** In addition, we elevate *D. aureifloris parvifloris* Prout, 1917 to specific rank as *D. parvifloris* Prout, 1917 **stat. nov.** and record *D. punctimargo* (Hampson, 1895), *D. aureifloris* Warren, 1896, and *D. parvifloris* for the first time from China. We provide a key for the species determination and illustrations of external features and genitalia of the Chinese species of the genus. Eight species of *Discoglypha* are now recorded in the fauna of China with 11 known species known worldwide.

Material and methods

All studied specimens, including the types of the new species, are deposited in the Institute of Zoology, Chinese Academy of Sciences, Beijing, China (IZCAS). The other cited museum where types are deposited is the Natural History Museum, London, United Kingdom (NHM). Terminology for wing venation follows the Comstock-Needham System (Comstock 1918) as adopted for Geometridae by Scoble (1992) and Hausmann (2001, 2004); that for genitalia follows Pierce (1914, reprinted 1976), Klots (1970), and Nichols (1989). Photographs of moths were taken with a digital camera. Composite images were generated using Auto-Montage software version 5.03.0061 (Synoptics Ltd). The plates were compiled using Adobe Photoshop software 7.0. Ink (Adobe Systems Software Ireland Ltd).

Taxonomy

Key to Chinese species of *Discoglypha*

1. Hindwing with two discal spots white, small and rounded *D. hampsoni*
- Hindwing with discal spot not as above described 2
2. Each wing with submarginal line appearing as a row of yellow spots 3
- Each wing with submarginal line not as a row of yellow spots 4
3. Protrusion at outer margin of discal spot of hindwing long *D. maculata* Xian & Han **sp. nov.**
- Protrusion at outer margin of discal spot of hindwing short *D. locupletata*
4. Hindwing with discal spot dark greyish with a white pupillary-shaped spot inside
..... *D. pupula* Xian & Jiang **sp. nov.**
- Hindwing with discal spot not as above described 5
5. Each wing with medial line black and band-like *D. obliquifascia* Xian & Cheng **sp. nov.**
- Each wing with medial line not as above described 6
6. Hindwing with discal spot large and rounded *D. punctimargo*
- Hindwing with discal spot with a small protrusion at outer margin 7
7. Hindwing with discal spot large *D. aureifloris*
- Hindwing with discal spot small *D. parvifloris*

1. *Discoglypha maculata* Xian & Han **sp. nov.** (Figs 1, 9, 17)

Description (male). Forewing length: 16 mm. Antennae slightly serrate, each segment with two pairs of fascicles of cilia; dorsal surface of shaft white at base, remaining part greyish brown. Frons and labial palpus reddish brown. Vertex white. Dorsal side of thorax and

abdomen yellowish brown. Wing ground colour yellowish brown. Forewing with outer margin shallow arched; costal margin blackish brown; antemedial line blackish brown and slightly curved outwards; discal spot blackish brown and small dot-like, with yellow outside; medial line blackish brown, narrow and indistinct band-like; postmedial line narrow and serrate. Hindwing with outer margin smooth; discal spot large, translucent, with a small protrusion at middle of outer margin. Each wing with submarginal line appearing as a row of yellow spots; marginal line appearing as blackish with triangular patches between veins; fringes yellowish brown. Underside with colour paler than upperside, transverse lines similar to those of upperside. Forewing with two accessory cells; R_1 and R_5 not stalked with R_{2-4} , R_5 rising from apex of second accessory cell. Hindwing with R_s and M_1 shortly stalked.



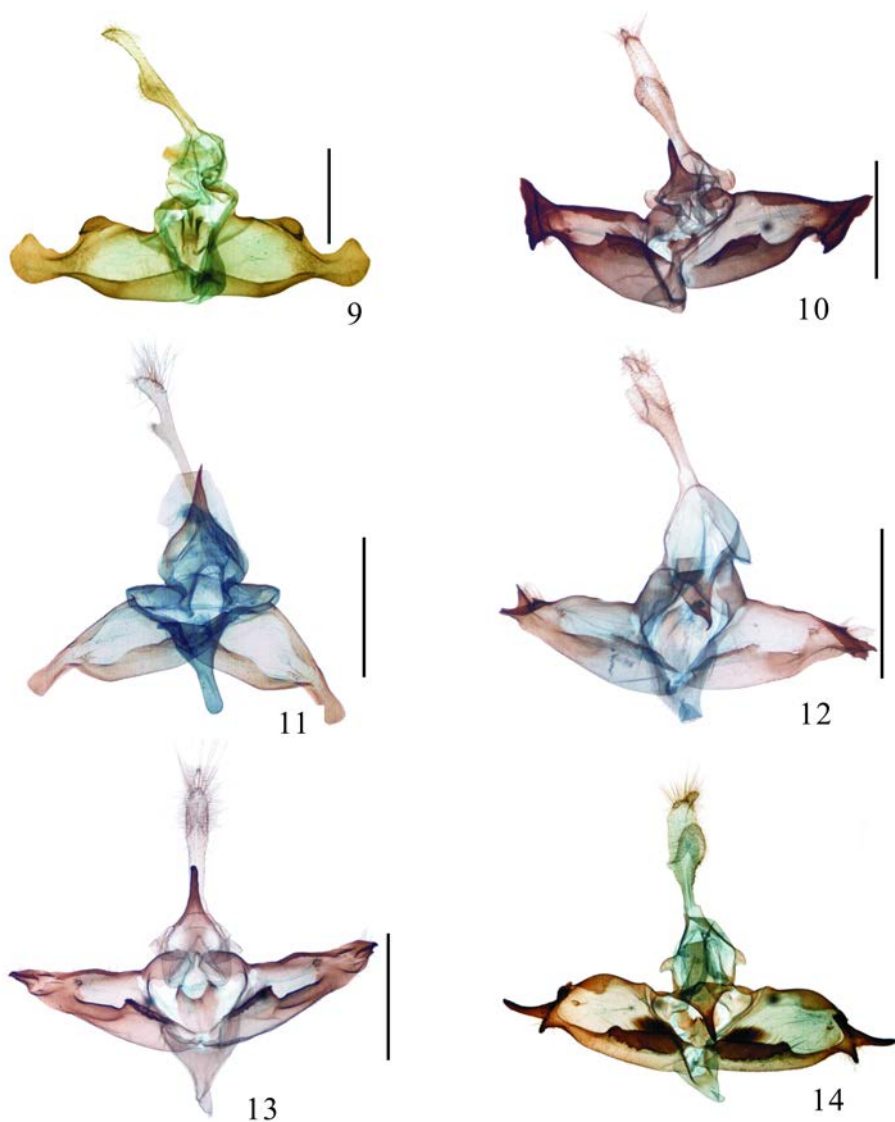
Figures 1–8. Adults of *Discoglypha*. 1. *D. maculata* Xian & Han **sp. nov.**, holotype; 2. *D. obliquifascia* Xian & Cheng **sp. nov.**, paratype; 3. *D. pupula* Xian & Jiang **sp. nov.**, paratype; 4. *D. parvifloris* Prout, 1917; 5. *D. aureifloris* Warren, 1896; 6. *D. punctimargo* (Hampson, 1895); 7. *D. locupletata* Prout, 1917; 8. *D. hampsoni* (Swinhoe, 1892). Scale bar = 1 cm.

Male genitalia (Figs 9, 17). Uncus narrow and long, with a small rounded protrusion at middle of ventral surface, falcate at apex. Gnathos with medial process weakly sclerotized. Valva with a rounded process at terminal part; dorsal margin arched at medial part. Juxta plate-like. Saccus almost semicircle. Aedeagus narrow; vesica with an irregular sclerotized area, without cornutus.

Holotype. ♂, **China**, Hainan, Bawangling, Dongerlingchang, 1015 m, 08–10-V-2007, coll. Fuqiang CHEN.

Etymology. The specific epithet is based on the Latin word *maculatus*, referring to the yellow spot-like submarginal lines on both wings.

Diagnosis. The wing patterns of the new species are similar to those of *D. locupletata* (Fig. 7), but the protrusion on the outer margin of the discal spot of the hindwing is longer than that of *D. locupletata*. The male genitalia of this new species are totally different from those of *D. locupletata* (Figs 15, 23), such as the terminal part of the valva is a rounded process, while the dorsal and ventral margin of the terminal part of the valva is separate in *D. locupletata*; the aedeagus has a curved process at posterior part and the cornutus is narrow and long in *D. locupletata*, however those characters are absent in the new species.

2. *Discoglypha obliquifascia* Xian & Cheng **sp. nov.** (Figs 2, 10, 18)

Figures 9–14. Male genitalia of *Discoglypha*. 9. *D. maculata* Xian & Han **sp. nov.**, holotype; 10. *D. obliquifascia* Xian & Cheng **sp. nov.**, paratype; 11. *D. pupula* Xian & Jiang **sp. nov.**, paratype; 12. *D. parvifloris* Prout, 1917; 13. *D. aureifloris* Warren, 1896; 14. *D. punctimargo* (Hampson, 1895). Scale bars = 1 mm.

Description (male). Forewing length: 14 mm. Head. Antennae with two pairs of serrations on each segment, middle one weaker than basal one, with fascicles of cilia terminally; dorsal surface of shaft white at base, remaining part blackish brown. Frons and labial palpus reddish brown to dark brown. Vertex white. Dorsal side of thorax and abdomen yellowish brown. Wing ground colour yellowish brown. Forewing with outer margin shallow arched; costal margin blackish brown; antemedial line blackish brown, narrow and indistinct; discal spot blackish brown and tiny; medial line blackish brown and narrow band-like.

Hindwing with outer margin smooth; medial line similar to that of forewing, but broader at middle. Each wing with postmedial line blackish brown, serrate and indistinct; marginal line blackish brown; fringes yellowish brown. Underside with transverse lines more indistinct than those of upperside. Forewing with two accessory cells; R_1 and R_5 not stalked with R_{2-4} , R_5 rising below apex of second accessory cell. Hindwing with R_s and M_1 shortly stalked.

Male genitalia (Figs 10, 18). Uncus narrow and long, expanded at middle of ventral surface, with a small process at apex. Gnathos with medial process acute. Valva with a fishtail shape and strongly sclerotized process at terminal part; dorsal and ventral margin strongly sclerotized; ventral margin concave at terminal half. Juxta short, wavy on posterior margin. Saccus narrow. Aedeagus narrow and hook-shaped at posterior part, without cornutus.

Holotype. ♂, **China**, Hainan, Baisha, Nankai, Nanmaola, 1261 m, 12–14-V-2009, Coll. Fuqiang CHEN. **Paratype.** 1♂, **China**, Hainan, Baisha, Nankai, Nanmaola, 1261 m, 12–14-V-2009, coll. Keji YAN.

Etymology. The specific epithet is based on the Latin *obliquus*- and *fascia*-, referring to the blackish brown medial lines on both wings.

Diagnosis. This new species can be easily identified from other congeners by the broader medial part of the medial line on the hindwing and the fishtail shaped terminal process of the valva of the male genitalia.

3. *Discoglypha pupula* Xian & Jiang sp. nov. (Figs 3, 11, 19, 25)

Description. Forewing length: 12 mm in male; 13 mm in female. Antennae in male similar to *D. obliquifascia* but the basal serration shorter; filiform in female; dorsal surface of shaft white at base, remaining part greyish brown. Frons and labial palpus dark reddish brown. Vertex white. Dorsal side of thorax and abdomen yellowish brown mixed with reddish brown. Wing ground colour reddish brown. Forewing with outer margin shallow arched; costal margin blackish brown; antemedial line blackish brown and wavy; discal spot black; medial line blackish brown, narrow band-like with outer margin serrate. Hindwing with outer margin smooth; discal spot dark greyish brown with a white spot inside, pupillary-shaped; medial line blackish brown, narrow band-like, slightly arched. Each wing with postmedial line blackish brown, serrate, indistinct, often dot-like on each vein; submarginal line appearing as blackish and triangular patches between veins; fringes reddish brown. Underside with colour paler than upperside, transverse lines similar to those of upperside. Forewing with two accessory cells; R_1 and R_5 not stalked with R_{2-4} , R_5 rising from apex of second accessory cell. Hindwing with R_s and M_1 shortly stalked.

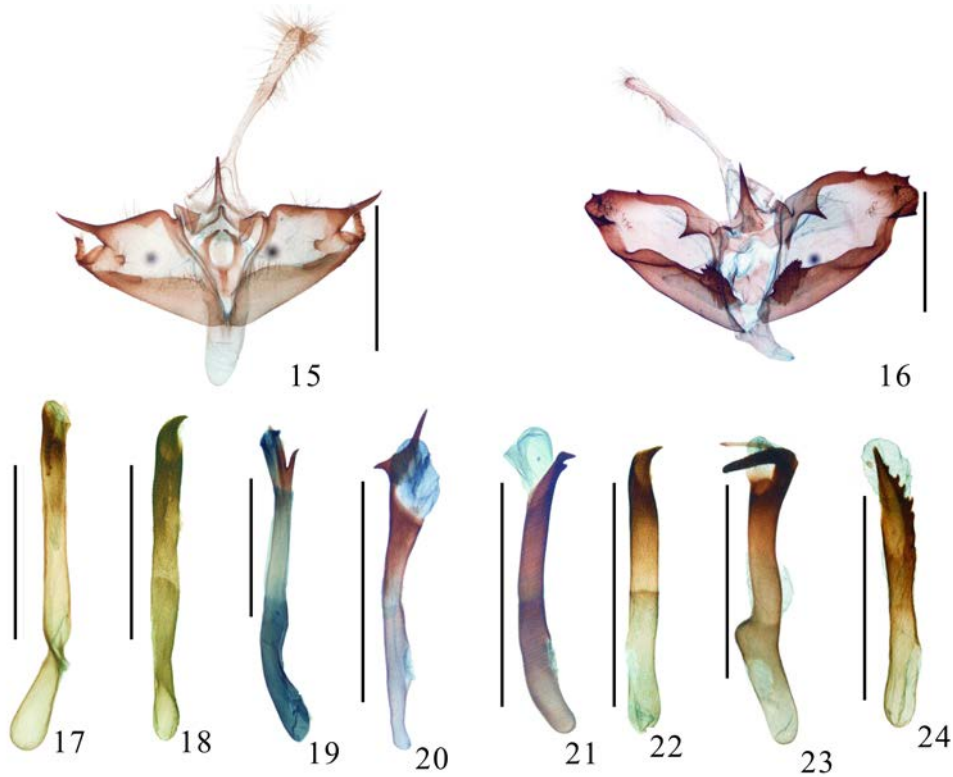
Male genitalia (Figs 11, 19). Uncus narrow and long, with a small rounded protrusion at middle of ventral surface, expanded and slightly curved at terminal part. Gnathos with medial process acute. Valva narrow and square at apex. Saccus narrow and long, rounded at apex. Aedeagus narrow, manica bifurcated at terminal half; without cornutus.

Female genitalia (Fig. 25). Papillae anales oval. Apophyses anteriores about two-thirds of apophyses posteriores in length. Lamella postvaginalis semicircular. Ductus bursae long and narrow, weakly sclerotized near ostium. Corpus bursae bag-like; signa shaped as two rounded sclerites, contacting at medial part.

Holotype. ♂, **China**, Yunnan, Pingbian, Daweishan, 2090 m, 04–08-VIII-2017, coll. Le CUI. **Paratypes.** 1♂, Guangxi, Napo, Defu, 1350 m, 18-VI-2008, coll. Wenzhu LI; 1♀, the

same as holotype; 1♂, Yunnan, Xinping, Gasayaonancun, 1900 m, 10-13-VIII.2017, coll. Le CUI.

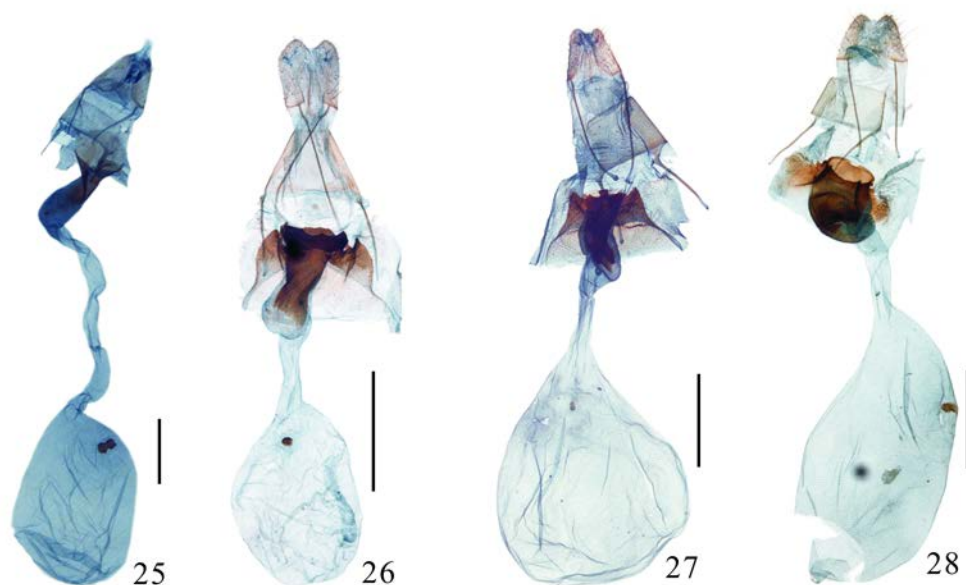
Etymology. The specific epithet is based on the Latin word *pupula*, referring to the pupillary shaped discal spot of the hindwing.



Figures 15–24. Male genitalia of *Discoglypha*. 15. *D. locupletata* Prout, 1917; 16. *D. hampsoni* (Swinhoe, 1892); 17–24. Aedeagus of *Discoglypha*. 17. *D. maculata* Xian & Han **sp. nov.**, holotype; 18. *D. obliquifascia* Xian & Cheng **sp. nov.**, paratype; 19. *D. pupula* Xian & Jiang **sp. nov.**, paratype; 20. *D. parvifloris* Prout, 1917; 21. *D. aureifloris* Warren, 1896; 22. *D. punctimargo* (Hampson, 1895); 23. *D. locupletata* Prout, 1917; 24. *D. hampsoni* (Swinhoe, 1892). Scale bars = 1 mm.

Diagnosis. The external characters of this new species are similar to those of *D. punctimargo* (Fig. 6). This species can be distinguished by the much smaller and darker pupillary shaped discal spot of the hindwing, while in *D. punctimargo*, it is much larger with blackish brown margin and greyish white inside, covered with blackish grey scales. The male genitalia of this new species are quite different from *D. punctimargo* (Figs. 14, 22), such as the uncus is narrower and without small apical process; the apex of the valva is square, while it has two finger-like processes (one long and one short) in *D. punctimargo*; the saccus is narrow and long, but it is triangular in *D. punctimargo*; the apical part of the manica is bifurcated, while in *D. punctimargo*, the apex of the aedeagus is pointed hook-like. The female genitalia of this new species are different from other congeners by the narrow and long ductus bursae and the signa being two rounded sclerites contacting in the middle.

4. *Discoglypha parvifloris* Prout, 1917 stat. nov. (Figs 4, 12, 20, 26), new record to China
Discoglypha aureifloris parvifloris Prout, 1917: 306. Holotype ♂, India: Sikkim (NHM).



Figures 25–28. Female genitalia of *Discoglypha*. 25. *D. pupula* sp. nov., paratype; 26. *D. parvifloris* Prout, 1917; 27. *D. aureifloris* Warren, 1896; 28. *D. locupletata* Prout, 1917. Scale bars = 1 mm.

Specimens examined. China, Fujian: 1♀, Wuyishan, Huangxizhou, 500 m, 16-VII-2013, coll. Chao YANG. Guangxi: 7♂4♀, Maoershan, Antangping, 1579 m, 17–18-VIII-2012, coll. Chao YANG; 1♂, Napo, Defu, 1350 m, 19-VI-2000, coll. Wenzhu LI. Sichuan: 1♀, Panzhihua, Daheishan, Fengjingqu, 2490 m, 10–12-VIII-2014, coll. Xiaodan PAN. Yunnan: 1♂1♀, Tengchong, Dashaoping, 2020 m, 24–26-V-1992, coll. Dayong XUE; 3♀, Tengchong, Heinitang, 1930 m, 28–30-V-1992, coll. Dayong XUE; 1♀, Weixi, Tacheng, 2800 m, 13–14-VII-2014, coll. Xinxin LI; 7♂1♀, Pingbian, Daweishan, 2090 m, 04–08-VIII-2017, coll. Le CUI. Tibet: 1♀, Mêdog, Pomogonglu 80 K, 2118 m, 25-VIII-2006, coll. Songyun LANG; 1♂, Mêdog, Lagong, Chachang, 1250 m, 17-VIII-2015, coll. Jian YAO *et al.* Vietnam, 1♂, 23-XI-02-XII-2012, coll. Fuqiang CHEN.

Distribution. China (Fujian, Guangxi, Sichuan, Yunnan, Tibet); Vietnam; India (Sikkim).

5. *Discoglypha aureifloris* Warren, 1896 (Figs 5, 13, 21, 27), new record to China

Discoglypha aureifloris Warren, 1896: 111. Syntypes 2♂, India: Khasi Hills (NHM).

Specimens examined. China, Guangdong: 1♂, Nanling, Babaosha, 1000 m, 30–31-VII-2013, coll. Dayong XUE. Guangxi: 3♂1♀, Huanjiang, Yangmeiao, 1189 m, 18–22-VII-2015, coll. Xinxin LI & Nan JIANG. Yunnan: 1♂, Pingbian, Daweishan, 2090 m, 04–08-VIII-2017, coll. Le CUI; 1♂, Xiping, Gasa, Yaonan, 1900 m, 10–13-VIII-2017, coll. Le CUI; 1♂, Yunnan, Mengla, 1200 m, 22-VII-2012, coll. Roger KITCHING & Louise ASHTON.

Distribution. China (Guangdong, Guangxi, Yunnan); India.

6. *Discoglypha punctimargo* (Hampson, 1895) (Figs 6, 14, 22), new record to China

Erythrolophus punctimargo Hampson, 1895: 453. Syntypes ♂, India: Sikkim (NHM).

Discoglypha punctimargo: Prout, 1934: 22.

Specimens examined. China, Hainan: 1♂, Lingshui, Diaoluosha, 260 m, 05-V-2007, coll. Songyun LANG; 1♂, Baisha, Nanmaola, 13-V-2009, coll. Fuqiang CHEN. Guangxi: Huanjiang, Yangmeiao, 1189 m, 18–22-VII-2015, coll. Nan JIANG. Yunnan: 2♂, Ailao Shan, 2200 m, 05-V-2011, 01-VIII-2011, coll. Roger KITCHING & Louise ASHTON; 1♂, Mengla, 1200 m, 17-VII-2012, coll. Roger KITCHING & Louise ASHTON. Tibet: 1♂, Mêdog, Yarang, 1091 m, 20–23-VIII-2006, coll. Songyun LANG.

Distribution. China (Hainan, Guangxi, Yunnan, Tibet); India (Sikkim).

7. *Discoglypha locupletata* Prout, 1917 (Figs 7, 15, 23, 28)

Discoglypha locupletata Prout, 1917: 307. Holotype ♂, India: Khasi Hills (NHM).

Specimens examined. China, Hainan: 1♂, Wuzhishan, 727 m, 06-XII-2007, coll. Jing LI; 2♂, Wuzhishan, Shuiman, 730–900 m, 08-V-2007, coll. Songyun LANG; 1♂, Qiongzong, Limushan, Qijiacun, 645 m, 03–04-IV-2010, coll. Nan JIANG; 3♂1♀, Baisha, Nankai, Nanmaola, 1261 m, 10-V-2009, 12–14-V-2009, coll. Keji YAN; 1♂, Baisha, Yinggezui, 611 m, 06–07-V-2009, coll. Keji YAN; 1♀, Baisha, Yinggeling, Baohuqu, Yinggezui, 619 m, 17–19-XI-2009, coll. Chao YANG. Guangxi: 1♂, Huanjiang, Yangmeiao, 1189 m, 18–22-VII-2015. Sichuan: 1♂, Emeishan, Qingyinge, 800–1000 m, 15-IX-1957, coll. Fuxing ZHU.

Distribution. China (Taiwan, Hainan, Guangxi, Sichuan); India.

8. *Discoglypha hampsoni* (Swinhoe, 1892) (Figs 8, 16, 24)

Idaea hampsoni Swinhoe, 1892: 14. Syntypes 7♂, India: Khasi Hills (NHM).

Organopoda fulvistriga Bastelberger, 1909: 39. Syntypes, China: Taiwan.

Discoglypha hampsoni: Prout, 1934: 22.

Specimens examined. China, Tibet: 1♂, Mêdog, Yarang, 1091 m, 20–23-VIII-2006, coll. Songyun LANG.

Distribution. China (Taiwan, Tibet); India; Sri Lanka.

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